REMARKS

Claims 1-21 are now pending in the application. Claims 1-21 stand rejected. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 103

Claims 1-21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Taga et al. (U.S. Pat. No. 5,872,647) in view of Epworth (U.S. Pat. No. 5,513,030). This rejection is respectfully traversed.

Taga et al. is generally directed toward an optical transmitting terminal. In particular, Taga et al. is directed toward converting light output from a light source to an RZ signal using an electro-absorption modulator, followed by modulation of the RZ pulse by a data modulator. The Examiner relies on Taga et al. primarily to teach generation of an RZ data signal having a duty cycle less than 50% at column 3, lines 14-18, which states in relevant part, "the width of the RZ pulse is preferably 30-80% of one bit time." The Examiner admits that Taga et al. does not teach detecting optical power level of the optical data signal and synchronizing the pulse and data streams based on the power level. The Examiner also admits that Taga et al. does not teach lowering the duty cycle by examining an eye-diagram of the modulated data; and lowering a crossing-level of the eye diagram to a value lower than fifty percent, with the value being selected based on an initial shape for the Return to Zero pulse and a shape of a data pulse of the data stream to avoid distorting a Return to Zero pulse of the pulse stream at an optimal synchronization setting. The Examiner further admits that Taga et al. does not teach reducing the duty cycle either by electrically reducing the duty cycle

at a data source or optically reducing the duty cycle at an optical modulator by adjusting an optical bias level of the optical modulator such that an electrical signal of the data source primarily drives a bottom portion of an electro-optic transfer function of the optical modulator.

Epworth is generally directed toward an optical pulse retiming and reshaping circuit. In particular, Epworth is directed toward using a slow photodiode to determine mean power transmitted by an optical pulse modulator, which is used to generate a control signal for use in a phase locked-loop to regulate the phase of an oscillator driving a pulse modulator that uses a sinusoidal function to attenuate a received optical data signal in order to return the pulses to zero at points between the received pulses. The Examiner relies on Epworth primarily to teach controlling the phase of the attenuator function by imparting a dither to the phase, detecting fluctuation of mean power of the downstream optical signal as a result of the imparted dither, and adjusting the phase control signal to substantially maximize the mean power. However, Epworth does not ever generate a data signal and does not variably attenuate a pulse signal with a data signal. Therefore Epworth does not ever synchronize a pulse stream with a data stream that variably attenuates the pulse stream to produce an optical data stream. Accordingly, Epworth does not teach, suggest, or motivate synchronizing a pulse stream with a data stream that variably attenuates the pulse stream based on detected optical power level of an optical data signal. Also, the Examiner admits that Epworth does not teach lowering the duty cycle of a data signal by examining an eye-diagram of the modulated data; and lowering a crossing-level of the eye diagram to a value lower than fifty percent, with the value being selected based on an initial shape for the Return

to Zero pulse and a shape of a data pulse of the data stream to avoid distorting a Return to Zero pulse of the pulse stream at an optimal synchronization setting. The Examiner also admits that Epworth does not teach reducing the duty cycle either by electrically reducing the duty cycle at a data source or optically reducing the duty cycle at an optical modulator by adjusting an optical bias level of the optical modulator such that an electrical signal of the data source primarily drives a bottom portion of an electro-optic transfer function of the optical modulator.

Applicants' claimed invention is generally directed toward synchronization of pulse and data sources. In particular, Applicant's claimed invention is directed toward synchronizing a pulse stream with a data stream based on optical power level associated with an optical data signal, wherein the data stream variably attenuates the pulse stream to produce the optical data signal. For example, independent claim 1, as amended, recites "synchronizing the pulse stream with the data stream based on the optical power level associated with the optical data signal, wherein the data stream with duty cycle less than fifty percent variably attenuates the pulse stream to produce the optical data signal." Accordingly, neither Taga et al. nor Epworth teach all of the elements of independent claim 1.

These differences are significant because Epworth shifts phase of a modulator that attenuates a received optical data signal, whereas Applicants' claimed invention shifts phase of a modulator that attenuates output of a light source to produce a pulse signal that has yet to be attenuated by a data signal to initially produce an optical data signal for initial transmission. This process initially produces a synchronized optical signal with greater reliability and less expense than is possible in the transmitter of Taga

et al.. Moreover, while Taga et al. may teach that a duty cycle can be less than 50%, it does not teach that the duty cycle needs to be less than fifty percent in order to ensure that the average power fluctuates during dither. Epworth fails to teach this requirement as well, apparently counting on drop off in power of the optical data signal over distance to ensure that the mean power level will not be constant during dither. Accordingly, the claimed sub-range of duty cycle significantly solves a difficulty in synchronizing a pulse and data stream in a transmitter that is not taught by the cited references. Finally, the Examiner's remarks that Applicants' claimed techniques (dependent claims 5-10) for lowering the duty cycle of the data signal to a selected value merely involve routine observation and experimentation are hereby challenged.

Accordingly, Applicants respectfully request the Examiner reconsider and withdraw the rejection of independent claim 1 and dependent claims 5-10 under 35 U.S.C. 103(a), along with rejection of all claims dependent therefrom.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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